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ADOPTION OF SUSTAINABLE RISK MANAGEMENT: A STUDY OF CHEMICAL EXPOSURE IN TEXTILE INDUSTRY IN NIGERIA

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ABSTRACT

The textile industry consists of a number of units engaged in spinning, weaving, dyeing, printing, finishing and a number of other processes that are required to convert fibre into a finished fabric or garment. Approximately 42% of chemicals manufactured globally are applied in textile industry and Nigeria's textile industry uses about 25% of the world's textile chemicals. The industry however exposes workers to many hazards and risks, ranging from exposure to noise and dangerous substances and chemicals, to manual handling and working with dangerous machinery. Each processing stage - from the production of materials to the manufacturing, finishing, colouring and packaging - pose risks for workers, and some of these are particularly dangerous to human's health. Risk is the possibility of suffering harm from hazard and hazard is a source of risk that refers to actions that can cause harm. No industrial sector today is free of risk belonging to its internal and external environment. It is obligatory at every step of industrial operation to make risk assessment. This article aims at studying each of these risks in relation to the Nigerian textile industries, along with the possible solutions for their assessment.

KEYWORDS: Chemical Exposure, Sustainable Risk Management, Textile Industry, Nigeria

INTRODUCTION

The textile industry has been criticized as being one of the world's worst offenders in terms of pollution because it requires a great amount of three components: Chemicals, dyes and water. Many different chemicals are added to textiles in their different life cycle stages. Many of these can be found in the finished articles and part of them end up in waste water or liquid after washing or chemical cleaning of textiles. As many as 2,000 different chemicals are used in the textile industry, from dyes to transfer agents. According to Ojo, (2003) approximately 42% of chemicals manufactured globally are applied in textile industry and Nigeria's textile industry uses about 25% of the world's textile chemicals. Dyeing agents and different auxiliary substances are also used in textile dyeing processes, to improve the attachment of colour into the fibre (KemI, 2009).

Almost all dyes used in textile industry are synthetic organic compounds. According to Talvenmaa (2002), there are more than 8,000 different synthetic dyes and almost 40,000 commercial dye products. The selection of dyes depends on the quality of the fibre and the fabric as well on the desired colour and its properties (Priha and Riipinen, 2005). There are two types of dyes: textile dyes that attach into the fibres, and pigments that are attached into the fabric using a binding agent. Hazardous substances used in dyes include e.g. the heavy metals copper (Cu), nickel (Ni), lead (Pb), mercury (Hg), cadmium (Cd), chromium (Cr), zinc (Zn) and arsenic (As) (Parvath, Makin & Sutherland, 2009). Many of these substances are carcinogenic.

Water is a finite resource that is quickly becoming scarce, and is used at every step of the process both to convey the chemicals used during every step and to wash them out before beginning the next step. The water becomes full of chemical additives and is then expelled as wastewater; which in turn pollutes the environment: by the effluent's heat; by its

increased pH; and because it's saturated with dyes, de-foamers, bleaches, detergents, optical brighteners, equalizers and many other chemicals used during the process.

Traditionally produced fabrics also contain residuals of chemicals used during their manufacture—chemicals that evaporate into the air we breathe or are absorbed through our skin. Some of the chemicals are used by traditional dyers in the production of fabrics are equally carcinogenic and may cause harm to children even before birth, while others may trigger allergic reactions in some people. According to James, James & Ashe (1990), the population that is allergic to chemicals will grow to 60 percent by the year 2020. These chemicals can be hazardous to the health of humans and animals, especially when a factory's chimney breathes them out or when people drop the chemicals into lakes, streams, oceans or rivers. Also most of the washing procedures for textiles are harmful to our environment and posses challenges to industries in developing countries like Nigeria.

Hazards and Health Risks in the Textiles Industry

The textiles industry has many hazards that can cause injury to workers, from transport in the workplace (lift truck), dangerous large work equipment and plant, to the risk of slips from a wet working environment. Workers being struck by objects, such as moving machinery parts and vehicles are a significant cause of injury in the sector. There also exists other health related risks as highlighted below by Heinrich, Petersen & Roos, (2000).

Musculoskeletal Disorders

Musculoskeletal disorders (MSDs) are the most common work-related health problem in textile industry, with almost one in four workers reporting backache and one in five complaining of muscular pains. In the textiles industry, risk factors for Musculoskeletal disorders include: Working in awkward postures, such as during spinning, cutting, product control, and packaging; Repetitive movements, such as during spinning, cutting, product control, and packaging; Fatigue from manual handling, during the storage, inspection, treatment, shipping, finishing, and cutting of textiles.

Exposure to Chemical Agents

Many different groups of chemical substances are used in the textiles industry, including dyes, solvents, optical brighteners, crease-resistance agents, flame retardants, heavy metals, pesticides, and antimicrobic agents. They are used in dyeing, printing, finishing, bleaching, washing, spinning, dry cleaning, and weaving. The textile industry has been evaluated as a sector with an increased carcinogenic risk. Several studies have showed an increased risk of nasal, laryngeal and bladder cancer.

Exposure to Dusts and Fibres

The exposure of workers to dusts from material such as silk, cotton, wool, flax, hemp, sisal, and jute can occur during weaving, spinning, cutting, ginning, and packaging. Division of tasks along gender lines may mean that women are exposed to organic dusts more than men, with respiratory diseases being diagnosed more often in women than men. Exposure to fibres and yarns may cause nasal or bladder cancer.

Exposure to Biological Agents

In some activities, such as carding and willowing, workers may be exposed to biological agents such as *anthrax*, *clostridium tetani* (the causative agent for tetanus), and *coxiella burnetti* (which causes Q fever). Exposure to biological agents can result in allergies and respiratory disorders.

Exposure to Physical Agents

Workers may also be exposed to noise and vibrations, for example during weaving, spinning, sewing, twisting, and cutting. Exposure to loud noise can result in permanent hearing damage such as noise-induced hearing loss and tinnitus. Exposure to vibration, particularly together with risk factors for MSDs, can lead to long-term harm. Electromagnetic fields may also be found in some workplaces in the textiles industry.

In all, Chemical exposure is the most problematic risk challenges to textile workers and the environment. The National Programme on Dangerous Chemicals from 2006 identified chemicals in textile articles as an issue where improved risk management is needed (Ministry of the Environment, 2006, p. 74-79). Also preliminary report on a study on "Control of chemicals in textile articles by (Häkkinen, 2010) identify the deficiencies of management measures on textile articles.

In most textile production processes variety of chemicals including hazardous ones are used liberally, due to both lacking regulation and management and to particular needs such as preservation during transport and for other such as market economic reasons thus, chemicals in textiles present a special challenge for risk management. The identification, assessment, management and surveillance of chemicals imported into textile articles pose therefore a major issue to be addressed.

LITERATURE REVIEW

The safety management principles of the ISO standards and of the standard textbooks on safety management seem to suggest that science and industry have reasonable models of how safe and reliable organizations should work. However, this is not the case. As Reber, Willin & Duhon (2003) point out, the organizational literature fails to deal specifically with either hazardous organizations or high levels of performance reliability. The standard texts on safety management, for example Heinrich, Petersen and Roos (2010), and Bird and Germain (2007) present neither specific models of the safety management system nor do they provide empirical evidence of how particular aspects of the suggested frameworks contribute to the overall level of HSE.

Hale and Baram (2009) conducted a thorough literature review on health, safety and environment (HSE) management and revealed a number of lines of research and isolated studies which seem to have few links with each other. They concluded that literature on SMS can be characterized, at least until the 1980s, as accumulated experience of common sense and as general management principles applied to the specific field of safety risk management. One of the earliest studies was that of Cohen (1997). He reviewed seven studies that dealt with critical determinants in different industrial settings. Some of the factors associated with high safety performance were: strong management commitment to safety; close contact and interaction between workers, supervisors, and management enabling open communications on safety as on other job matters; workforce subject to less turnover, including a large core of married, older workers with significant length of service in their jobs; high level of housekeeping, orderly workplace conditions, and effective environmental quality control; well developed selection, job placement, and advancement procedures and other employee support services; training practices emphasizing early indoctrination and follow-up instruction in job safety procedures; evidence of added features or variations in conventional safety practices serving to enhance their effectiveness.

Shafai-Sahrai (2001) examined 11 matched pairs of companies conducting on-site interviews and site inspections at each. Factors prevalent in low injury rate companies were senior management involvement in safety; prioritization of safety in meetings, and in decisions concerning work practice; better injury record keeping systems; use of accident cost analysis; reduced span of supervisor responsibility; spacious and clean workplace environment; and improved safety

devices on machinery. Additionally, Cohen and Cleveland (2003) reported findings from a linked series of studies examining health and safety management in organizations with good safety performance across different industries. Methods included a questionnaire survey of 42 matched pairs of plants with low and high accident rates, with seven pairs of these subject to detailed site surveys. Those 7 with lower accident rates were characterized by a strong management commitment to safety; a humanistic approach to dealing with employees, with frequent positive contact and interaction; encouragement of hazard identification by workers; better housekeeping and general plant cleanliness; presence of both informal and formal workplace inspections; greater availability and use of personal protection equipment; improved employee selection procedures; low turnover and absenteeism; and better plant environment.

Referring to these studies, Chew (2005) compared safety activities in 18 pairs of low and high injury rate companies, drawn from three Asian countries. Prevalent factors were supervisory involvement in safety activities; safety inspection; safety training; use of accident record analysis for prevention purposes; carefully applied safety rules; machine guarding; supply of personal protection equipment; and standard of housekeeping. Shannon, Walters, Lewchuk, et al. (2006) conducted a postal survey of over 400 manufacturing companies, each having at least 50 employees. The defining features of organizations with lower rates of lost time injuries included managers who perceived more participation in decision-making by the workforce and more harmonious management-worker relations; encouragement of long-term career commitment; provision of shortand long-term disability plans; definition of health and safety responsibilities in every manager's job description; performance appraisals with topics related to health and safety; and more frequent attendance of senior managers at health and safety meetings.

A Study conducted by (Priha & Riipinen, 2005) also showed that workers in the textile industry are also exposed to a number of chemicals, especially those engaged in the activities of dyeing, printing and finishing. Chemicals based on benzidine, optical brighteners, solvents and fixatives, crease-resistance agents releasing formaldehyde, flame retardants that include organophosphorus and organobromine compounds and antimicrobial agents are used in textile operations.

Mangal, (2010) examined the links between exposure to formaldehyde and nasal and lung cancer as well as to brain cancer and leukemia, which can be fatal. This study revealed that in the long run, exposure to formaldehyde could lead to respiratory difficulty and eczema. Contact of the chemicals with skin as well as inhalation of the chemicals can lead to several serious health effects.

Study conducted in by Hale & Hovden, (2008) revealed a correlation between the presence of cancer of the buccal cavity and pharynx and occupation in the textile industry. Another study revealed that textile workers were at high risk for developing cancer of the stomach while another study indicated a low degree of correlation between oesophageal cancer and working in the textile industry. Moreover, a high degree of colorectal cancer, thyroid cancer, testicular cancer and nasal cancer was observed among textile workers. Also, a relationship between the presence of non-Hodgkin's lymphoma and working in the textile industry was observed.

A study conducted on 1300 people working in 'tie and dye' units in Jodhpur and neighboring areas by Kant, 2012), 100 workers were observed to have occupation-related dermatitis. This constituted 7.69% of the total sample. Red RC base and naphthol were observed to be the most common culprits in this regard.

Shannon, Mayr and Haines (2007) reviewed 10 studies each including at least 20 separate workplaces or organizational units and using injury rates as an outcome variable. Forty-eight variables representing areas of management practices were examined. The study only listed the practices consistently associated with performance, i.e. the association

was significant on one direction in at least two thirds of studies in which it appeared, and the direction of relationship was consistent for all studies.

Finally, an extensive review on the literature dealing with internal management system of organizations was provided by Hale and Hovden (2008). Literature on risk management at the national or industry level dealing with regulation, standard setting, risk policies, enforcement, and the management of individual workplaces and work groups was excluded. These concern notably participative management studies and studies of high reliability organizations, which concern themselves with on-line management of risk, as opposed to the off-line concern with management structure found in much of the literature.

Risk and Risk Management

Every organization and association has its own risk management tools and techniques and it depending on the nature and size of business, and the level of risk is also depends on the size and operation of business. For example, textile companies with a complex chain of processes and whose business operation is across the world has more probabilities of risk occurrence and hence requires proper risk management policies and techniques for minimizing the risk.

Risk

Risk can be defined as the probability of harmful consequences (ISDR, 2002), or expected losses (lives lost, persons injured, damage to property and/or the environment, livelihoods lost, disruption of economic activity or social systems) due to the interaction between humans, hazards and vulnerable conditions. According to Hakkinen, (2010) the term risk can be defined as," the chance of something happening that will have an impact on objectives. A risk is often specified in terms of an event or circumstances and the consequences that may flow from it. Risk is measured in term of combination of the consequences of an event and their likelihood." Risk is usually associated with the inability of men to manage hazard events that may eventually lead to negative consequences like destruction of the environment, socio-economic activities, properties and losses of lives (Sadgrove, (2005).

In other words, Risk can be seen as the possibility that a particular hazard might exploit a particular vulnerability (Nierkerk, 2002). It is the production of the possible damage caused by a hazard due to the vulnerability within a community. In other words, risk is usually due to hazard events exploiting the vulnerable situation of an environment or community. A risk is a random event that may possibly occur and if it did occur, would have a negative impact on the organization goals (David, 2008). Risk is based on three factors: hazards, exposure and vulnerability.

Hazard

Hazard can be defined as a potentially damaging physical event, phenomenon or human activity which may cause the loss or life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include hidden conditions that may represent future threats and can have different origins. These include natural (geological, hydro-meteorological and biological) and/or induced by human processes (environmental degradation and technological hazards) (ISDR 2004). According to Niekerk (2002), hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity and probability. Typical examples of hazards can be the absence of rain (leading to drought) or the abundance thereof (leading to flooding). Chemical manufacturing plants near settlements can also be seen as hazards. Similarly, chemicals, dyes and textile waters from factory chimney or when people drop the chemicals into lakes, streams, oceans or rivers. Hazards can either be a creation of humans or the

environment. Although the former can be planned for than the latter, in both cases, the management of hazard will remain the same.

EXPOSURES AND VULNERABILITIES

Exposure

Exposure refers to the elements that are subject to the impact of a specific hazard (Aven, 2008). Tangible, intangible and institutional are the basic elements of exposure. Tangible elements include people, building and infrastructure related to power and water supply. Intangible elements include heritage and community relationship. Capacity to share information and the effectiveness of emergency management plans and coordination arrangements are the institutional elements. (Keml, 2009). Exposure shapes the risks from chemicals in textiles: the dose makes the poison. Exposure scenarios generally depend on the chemical and its occurrence in textiles or other materials after release, its bioavailability in the environmental matrices as well as on the vulnerability (proximity and behaviour) of the organisms exposed.

These scenarios need to be specified to assess risks more realistically. However, for many chemicals in textiles, assessment is based crudely on limited concentration. Exposure of workers and consumers to chemicals in textiles naturally takes place through skin and nose. These routes can be important for contact allergens and skin-permeable substances. Of other exposure routes, inhalation is important for dust-laden and volatile chemicals.

Vulnerability

According to Shafai (2001) the term vulnerability has been defined in the following words. “Vulnerability is the human dimension of disasters. To understand what makes people vulnerable, we have to move away from the hazard itself to look at a much wider, and a much more diverse, set of influences: the whole range of economic social, cultural, institutional, political and even psychological factors that shape people’s lives and create the environment that they live in.”. All these variables, that is risk, hazard, exposure and vulnerability resulted in what is called disaster.

Disasters

Disaster is a serious disruption of the functioning of a society, causing or threatens to cause, widespread human, material, or environmental losses which exceed the ability of affected community to cope using only its own resources (Parvath, et. al, 2009). Disasters can be sudden (flash floods) or progressive (drought). Disasters are caused due to the interaction of humans with their environment. A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk (ISDR, 2002). Extreme natural phenomena do not in themselves constitute hazards. It is only when such phenomena occur in an environment where they pose a threat to human life, property, infrastructure or the environment that they can be classified as hazards. Similarly in the case of technological developments, it is only when such developments pose a danger e.g. industrial accidents, infrastructure failures. In essence, a disaster is the result of a hazard’s impact on society. So the effects of a disaster are determined by the extent of a community’s vulnerability to the hazard.

Hazards in themselves do not constitute disasters. The magnitude of disaster, according to Niekerk (ibid) is usually described in terms of the adverse effects which a disaster has had on lives, property and infrastructure; environmental damage; and the costs attached to post disaster

Recovery and rehabilitation. Simply out, therefore, disaster risk is the product of the combination of three elements – vulnerability, coping capacity and hazard (ISDR, 2004).

Risk Management

Risk management is any set of actions taken by individual corporations in an effort to alter the risk arising from their business Massey, Hutchins, Becker and Tickner (2008). Also Risk management is the identification, assessment, and prioritization of risks (defined in ISO 31000 (2009) as the effect of uncertainty on objectives, whether positive or negative) followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities; while risk assessment is the qualitative and quantitative evaluation of the risk posed to human health or the environment by the actual or potential presence or use of specific materials, conditions, or procedures. The end result of risk assessment is therefore termed risk management (David & Webster, 2007). Management as a function comprises all processes and functions resulting from the division of labor in an organization such as planning, organizing, leading and controlling (Crockford, 1996). In most organizations more or less formalized management systems serve to structure, develop, and direct business processes. Risk management within the organizations and government bodies is becoming very important in these days. All level of organization is involved in the management of risk. (Dorfman, 2007). No business is risk free as at any time, something wrong happen that leads to a heavy lose. While doing business, there is no point for avoiding risks completely.

The essence of risk management is to prepare, protect, and preserve the resources of the enterprise. This approach demands analyzing the current and past operating hazard, risk, and loss producing patterns and forecasting expected hazard, risk, and loss-operating patterns. According to Bamber (2003), risk control strategies may be classified into four main areas: risk avoidance, risk retention, risk transfer and risk reduction. Risk avoidance means the deliberate decision on the part of the organization to avoid a particular risk. Risk retention relates to the decision of the organization to meet any resulting loss from within the organization's financial resources. Risk transfer refers to the legal assignment of the costs of potential losses from one party to another. The most common approach is by insurance. The principles of risk reduction or risk control rely on the implementation of a Health, Safety and Environment (HSE) program, whose basic aim is to protect the company's assets from wastage caused by accidental loss.

The system elements to be managed in risk management include amongst others:

- Health and safety of employees, suppliers, contractors, customers, and residents of the community (e.g. improvement of public health and safety),
- Reliability and safety of products and services, of materials, equipment, work systems, and plants, of transport of hazardous goods,
- Integrated pollution control, radiation protection, waste minimization, recycling, and waste disposal,
- Sustainable management of natural resources (soil, water, natural areas and coastal zones), reduction in the consumption of non-renewable energy.

Sustainable development means the improvement in the quality of life which does not impair the ability of the ecosystem to maintain life. Managing for sustainability is predominantly based on the principles of inter-generational and intra-general equity as well as social and ecological balance (Covello & Allen, 1988).

Adoption of Sustainable Risk Assessment and Management in Textile Industry

Risk management process helps in risk management plan, and steps involved in this process that has been set out by health, safety and environmen risk management standard (1997) & Kant, (2012) can be highlight generally.

Step 1: Identifying Hazard Risks and Those at Risk

The first step is identifying risks and description by determining the possible causes. Many techniques can use for identification. Examples are records, experience, brainstorming, system analysis and scenario analysis. Risk identification is a step where organization exposure to uncertainty can be identified. For this purpose, in -depth knowledge of organization is essential. Marker in which it is operating, legal, political, social and cultural environment in which it exits needs interrelated knowledge. Risk identification is an approach that ensures all significant activities within organizations and all possible risk flown from these activities defined. Looking for those things at work that have the potential to cause harm, and identifying workers who may be exposed to the hazards. Using workers' knowledge helps to ensure hazards are spotted and workable solutions implemented. Consultation encourages workers to commit themselves to health and safety procedures and improvements.

A risk assessment should cover all workers regardless of whether they are employed on long- or short-term contracts. Where there are persons employed by another organisation on site, there is a duty on the two employers to cooperate and safeguard the health and safety of workers. Risk assessment should take account of differences in workers, such as by gender, age, or disability. For example, older employees may learn differently than a younger worker, and also have different concepts of risk due to a lack of experience. Different prevention measures may be required for these worker groups. Work, its organisation and the equipment used should be adapted to the worker.

Step 2: Evaluating and Prioritising Risks

Having spotted the hazards, you then have to decide what to do about them. The law requires you to do everything 'reasonably practicable' to protect people from harm. You can work this out for yourself, but the easiest way is to compare what you are doing with good practice.

Evaluate how likely it is that the hazard will lead to harm or injury, and how severe that injury is likely to be. Consider what control measures are in place and whether they are sufficient. It is essential that the work to be done to eliminate or prevent risks is prioritised. The focus for cost-effective and sustainable risk management should be on collective protection and preventative measures.

Step 3: Deciding on Preventive Action

Strategies are made directing towards risks that are evaluated in the previous step and actions for, avoiding the risk by stopping the activity that generate risks, Reducing the consequences of the occurrence and transferring the risk. Selected treatment strategy are used for specify risk. Identifying the appropriate measures to eliminate or control the risks. List the preventive measures needed in order of priority, then take action, involving the workers and their representatives in the process. Targeting the underlying problems is the most cost-effective method of risk management.

In other words, it is the process in which selected and implemented measures modify the risk. Every organization and association has its own risk treatment system. International Risk Standard (IRS) 2002 explains that any risk treatment system should provide as minimum effective and efficient operation, effective internal control and compliance with legal rules and regulations of organization.

Step 4: Taking Action

Risk assessment is the first step to successful risk management. Put in place the preventive and protective measures through a prioritisation plan (most probably all the problems cannot be resolved immediately) and specify who does what and when, when a task is to be completed, and the means allocated to implement the measures. Interventions

should be agreed with the workforce, either directly or through worker safety representatives. The agreed solutions should be carefully implemented, monitored and evaluated. The information arising from the risk assessment must be shared with the appropriate persons. Action should be supported by appropriate training.

Step 5: Monitoring and Reviewing

Monitoring is an important step in the risk management process. It contains about monitoring all steps involved in the process and any new risk and changing the current assessment strategies. For monitoring risk, a registered database is main tools for this purpose. Ranking of risks, persons responsible for specific risk are recorded in this database. Time to time updating of register data base would be an integral part of the ongoing project management process. It has to be revised whenever significant changes occur in the organisation or as a result of the findings of an accident or "near miss" investigation.

CONCLUSIONS

Assessing and managing the risks of hazardous chemicals should play an important role in any textile industry. It is essential that the workers be aware of the various occupational hazards in the industry. At the same time, it is necessary that the management take the necessary steps to protect workers from potential hazardous situations. Safety management in the textile workplace should be more than just a "paper system" of policies and procedures. A Safety Management System (SMS) should start and end with an analysis of what is contained in the paperwork and emphasize how the system should be transferred into practice. Such an analysis should identifies what an organization should be doing to protect its workers, the public and the environment from harm and also reveal what is actually happening at the worksite and whether or not people and the environment are being protected and adverse events are not occurring.

The following suggestions can be made to improve and manage the risks of hazardous chemicals to workers' health conditions the in textile industry:

- The management should regularly check and document the national laws and regulations concerning workplace safety and develop a protocol through which to implement these laws.
- An inventory and risk assessment of all chemicals and dyes that are present at the factory must be undertaken by the management and the information in the inventory and risk assessment must be made available to all workers.
- Dyes, chemicals and other auxiliaries should be stored in a separate work area and access to this area should be limited to trained personnel. The storage area should be kept relatively cool and dry (within the range specified in MSDS), and all items must be recorded in log books and clearly labelled in a language understood by the chemical handlers
- To minimize exposure to hazardous chemicals appropriate personal protective gear should be used. This may include gloves, safety glasses and masks depending on the chemicals being handled
- Employees that work in the laboratory must be made aware of the risks of the chemicals and equipment they are using. They should be properly trained in the use of machinery, laboratory equipment, and the use of dyes and chemicals, as well as the importance of keeping logs of chemicals used
- Sufficient fire extinguishers should be made available and signs should be placed in prominent places so that people are aware of their presence; and there should also be signs saying "No Food and Drink" in areas such as

the laboratory, store room and factory floor, and any other areas where it is not safe to consume food, for example because of the risk of contamination by chemicals.

- The working environment should be kept as dry as possible to prevent accidents. Signs informing people of damp and wet floors must be displayed when required. Dust should also be minimized or extracted to reduce inhalation of particles
- Proper training on the use and maintenance of machinery and other equipment; Health and Safety; and Fire Hazards and Emergency, needs to be provided. Training should be repeated regularly - at least once a year.
- Medical examinations should be conducted by the employers for the workers from time to time. If significant occupational health problems are observed, appropriate measures should be taken by the management.

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